

REMARKS

The above amendments and these remarks are responsive to a non-final Office Action issued on March 24, 2009. The Office Action rejected claim 1 under 35 U.S.C §102(b) as being anticipated by Couture (US 5,355,039). Claims 1-10, 19 and 21 were rejected under 35 U.S.C §103(a) as being unpatentable over Gründl (DE 10112799) in view of Couture. Claims 11 and 14-17 stood rejected under 35 U.S.C §103(a) as being unpatentable over Ishiyama (U.S. 5,632,351) in view of Gründl and Couture. Claim 12 was rejected under 35 U.S.C §103(a) as being unpatentable over Ishiyama, Gründl and Couture, and further in view of Kim et al. (U.S. Publication 2001/0054730). The Office Action rejected claim 13 under 35 U.S.C §103(a) as being unpatentable over Gründl and Couture in view of Jackson et al. (U.S. Patent 2,942,165 previously presented).

By this Response, claims 1, 7, 8, 13 and 14 are amended. No new matter is added. Claims 1-17, 19 and 21 are now active for examination.

Independent claim 1, after the amendment, further describes specific structure and spatial relationships and characteristics of different elements in the claimed power converter. It is submitted the cited documents, either standing alone or combined, fail to teach the claimed features. Favorable reconsideration of the application is respectfully requested. Specific issues raised by the Office Action are addressed below.

The Anticipation Rejection of Claim 1 Is Overcome

Claim 1 was rejected as being anticipated by Couture. The anticipation rejection is overcome because Couture fails to meet every limitation of claim 1.

Claim 1, as amended, describes power converter arranged in series and coaxial with a motor along a direction of an output shaft to form a unitary structure through which the output

shaft extends. The power converter comprises a plurality of coolers, each of which extends along a radial direction with respect to an output shaft so as to be perpendicular to the output shaft and has a cooling surface defined by a direction parallel to the output shaft and the radial direction. Each cooler is formed with a plurality of coolant passageways therein such that each coolant passageway linearly extends along a direction parallel to the radial direction or along a direction parallel to the output shaft. The power converter further includes a plurality of power semiconductor modules. Each power module is mounted on the cooling surface of corresponding one of the coolers in a symmetric manner relative to the corresponding cooler, and extends in the radial direction along with the cooling surface.

Since the power converter is arranged in series and coaxial with the motor along the direction of the output shaft to force the unitary structure through which the output shaft extends, the entire size of the system can be reduced. Also, reduced size and improved cooling performance are achieved as each power semiconductor module is mounted on the cooling surface of corresponding one of the coolers in a symmetric manner relative to the corresponding cooler, and each cooler is formed with the plurality of coolant passageways therein such that each coolant passageway linearly extends along the direction parallel to the radial direction or along the direction parallel to the output shaft.

In contrast, while Couture relates to an electrically motorized wheel, Couture's device lacks the specific spatial characteristics and relationships as defined by claim 1. For example, in Couture, the power converter is arranged in series with the motor along the radial direction perpendicular to the output shaft, and is completely silent as to the specific structure of the power converter being arranged in series and coaxial with the motor along the direction of the output shaft to form the unitary structure through which the output shaft extends.

Furthermore, Couture fails to disclose that (1) each of which is mounted on the cooling surface of corresponding one of the plurality of coolers in a symmetric manner relative to the corresponding cooler, and (2) each cooler is formed with a plurality of coolant passageways therein such that each coolant passageway linearly extends along the direction parallel to the radial direction or along the direction parallel to the output shaft.

Since Couture fails to meet every limitation of claim 1, the anticipation rejection based on Couture is untenable and should be withdrawn. Favorable reconsideration of claim 1 is respectfully requested.

The Obviousness Rejections Are Overcome

(1)

Claims 1-10, 19 and 21 depend on claim 1 and were rejected as being unpatentable over Gründl in view of Couture. The obviousness rejection is respectfully traversed because Gründl, even if modified by Couture, still fails to meet the limitations of claim 1, all of which are incorporated into claims 1-10, 19 and 21 by virtue of their dependencies.

Couture, as discussed earlier relative to claim 1, fails to teach various claim limitations of claim 1.

Gründl, too, shares similar deficiencies. Gründl describes a fluid cooled electric machine having a coaxial cooling channel 32. However, Gründl lacks the specific spatial characteristics and relationships as defined by claim 1. For example, similar to the deficiencies of Couture, the power converter in Gründl is arranged in series with the motor along the radial direction perpendicular to the output shaft, and fails to disclose that the power converter is arranged in series and coaxial with the motor along the direction of the output shaft to form the unitary

structure through which the output shaft extends, as required by claims 1-10, 19 and 21 by virtue of their dependencies from claim 1.

Furthermore, Gründl fails to disclose that (1) each of which is mounted on the cooling surface of corresponding one of the plurality of coolers in a symmetric manner relative to the corresponding cooler, and (2) each cooler is formed with a plurality of coolant passageways therein such that each coolant passageway linearly extends along the direction parallel to the radial direction or along the direction parallel to the output shaft, as required by claims 1-10, 19 and 21 by virtue of their dependencies from claim 1.

Therefore, Gründl and Couture, even if combined, still fail to meet every limitation of claims 1-10, 19 and 21. Accordingly, the obviousness rejection based on Gründl and Couture is untenable and should be withdrawn. Favorable reconsideration of claims 1-10, 19 and 21 is respectfully requested.

(2)

Claims 11 and 14-17, directly or indirectly, depend on claim 1 and were rejected as being unpatentable over Ishiyama in view of Gründl and Couture. Claim 12 is dependent on claim 1 and was rejected as being unpatentable over Ishiyama, Gründl and Couture, and further in view of Kim. Claim 13 depends on claim 1 as being unpatentable over Gründl and Couture, and further in view of Jackson. These rejections are overcome because the cited documents, even if combined, fail to meet every limitation of the claims.

As discussed earlier, Gründl and Couture, either alone or combined, fail to teach features described in claim 1, all of which are incorporated into claims 11-17 based on their dependencies. Neither Ishiyama nor Kim nor Jackson alleviates these deficiencies.

Ishiyama describes a power converter having an inverter 11, a motor 12 and a shaft 13; Kim relates to a metal-insulator-metal capacitor having a planar shape or the like; and Jackson describes a liquid cooled current rectifiers attached to a conduit member 6. However, all these three prior art documents are silent as to the specific structure of the present invention. These documents fails to teach that the power converter is arranged in series and coaxial with the motor along the direction of the output shaft to form the unitary structure through which the output shaft extends, as required by claims 11-17 by virtue of their dependencies from claim 1.

Furthermore, Neither Ishiyama not Kim nor Jackson discloses that (1) each of which is mounted on the cooling surface of corresponding one of the plurality of coolers in a symmetric manner relative to the corresponding cooler, and (2) each cooler is formed with a plurality of coolant passageways therein such that each coolant passageway linearly extends along the direction parallel to the radial direction or along the direction parallel to the output shaft, as required by claims 11-17 by virtue of their dependencies from claim 1.

Accordingly, Gründl and Couture, even if further modified by Ishiyama, Kim and/or Jackson, still fail to meet every limitation of claims 11-17. Therefore, the obviousness rejections are overcome. Favorable reconsideration of claims 11-17 is respectfully requested.

CONCLUSION

Applicants believe that this application is in condition for allowance, and request that the Examiner give the application favorable reconsideration and permit it to issue as a patent. If the Examiner believes that the application can be put in even better condition for allowance, the Examiner is invited to contact Applicant's representatives listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper,

including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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